

REMARKS

Claims 1-43 were originally pending in the application. Claims 1-15 are allowed. Claims 16-18, 20-23, 25-41, and 43 are rejected. Claims 19, 24, and 42 are objected to. Claims 16-19, 25, 28, 32-35, 38, 40, 42, and 43 have been amended. Claim 39 has been cancelled. New claims 44-56 have been added. Claims 1-38 and 39-56 are now pending in the application. Favorable reconsideration and allowance of this application is respectfully requested in light of the claim amendments and the following remarks.

I. Drawings

As an initial matter, the Office Action Summary indicates that the drawings currently on file are those filed by Applicant on October 10, 2001. Applicant notes, however, that Formal Drawings were filed on December 4, 2001. Applicant encloses that submission, along with the return postcard as proof of submission. Applicant further encloses a set of “marked-up” drawings including Figs. 3, 4, and 6-9, with changes to the drawings filed on December 4, 2002 identified in red. Applicant also submits herewith a “clean” set of new Formal Drawing sheets 1-12 bearing Figs. 1-13 that incorporate the changes to Figs. 3, 4, and 6-9.

The Office Action raises numerous objections to the drawings, each of which addressed in-turn:

1) The drawings do not identify reference numeral 28. Applicant has amended Paragraph 48 of the specification to change “cartridge 28” to “cartridge 38”. Applicant further notes that cartridge 38 is properly identified throughout the drawings.

2) Reference character 456 is not in the drawings. In the enclosed “marked-up” copy of Fig. 6, Applicant has drawn a red circle around reference numeral 456 to illustrate that numeral 456 was in the drawings as initially filed. Applicant further encloses marked-up copies of Figs. 4 and 7-9 that, in red ink, change the enumerated circuit “~~56~~, ~~156~~, ~~256~~, and ~~356~~” to “456” for the purposes of consistency with Fig. 6.

3) Reference character “262” is not found in Fig. 8. Applicant has drawn a red circle around reference numeral “262” to illustrate that numeral 262 was in the drawings as initially filed.

4) Reference numeral 30 of Fig. 3 is not described in the application. Reference numeral 30 has been removed from the drawings.

5) Reference numeral 31 of Fig. 4 is not described in the drawings. Reference numeral 31, 131, 231, and 331 of Figs. 4 and 7-9, respectively, have been changed to 82, 182, 282, and 382 for the purposes of consistency with Fig. 10.

6) The Office action calls out numerous reference numerals of Figs. 7-9 that are not mentioned in the description. However, Applicant notes that all identified reference numerals are incremented from reference numerals of Fig. 4 that are specifically called out in Paragraphs 61-68 of the specification. Applicant further directs the Examiner's attention to Paragraphs 78, 81, and 83, which specifically state that the reference numerals of 7-9 corresponding to like elements of Fig. 4 have been incremented by 100, 200, and 300, respectively. Accordingly, Applicant asserts the description of Fig. 4 is sufficient for the purposes of describing the like elements of Figs. 7-9.

7) Reference character 420 in Fig. 6 has been used to designate both the current amplifier and the proportional amplifier. Applicant has changed the proportional amplifier 420 to 426. This correction is supported by Paragraph 74 of the specification.

8) Reference character "243" appears to be drawn to 2 distinct portions of Fig. 8. Applicant further notes that reference numerals 43, 143, and 343 are drawn to the same distinct portions in Figs. 4, 7, and 9, respectively. Applicant therefore amends Figs. 4 and 7-9 to change the divider plate 43, 143, 243, and 343, respectively, to 47, 147, 247, and 347. Applicant has further amended Paragraphs 56 and 61 of the present application to reflect the drawing changes.

Applicant submits that each and every objection to the drawings has been overcome. Accordingly, withdrawal of the objection is respectfully requested.

II. Specification

Paragraph 48 has been amended to properly label the cartridge "38" as described above.

Paragraphs 56 and 61 have been amended to label the divider plate "47" as described above.

Paragraph 75 has been amended to properly label the controller "430" as illustrated and as stated throughout the application.

Paragraph 75 has also been amended to properly identify the demand current as being sensed by resistor 414, as illustrated and described throughout the application.

III. Claim Objections

Claim 33 is objected to because the claim does not end in a period. Claim 33 has been amended to overcome this objection. Withdrawal of the objection is therefore respectfully requested.

IV. Claim Rejections Under 35 U.S.C. §112

Claims 18, 28-32, 34, and 38 are rejected as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A) Claim 18 recites the limitation “the pumping device” in line 2. Claim 18 has been amended to instead recite “the air mover” to overcome the rejection.

The Office Action further applies the rejection of claim 18 to claims 29-32. Claim 29 recites the claim term “the pump head” which has antecedent basis in element (B) of claim 28 from which claim 29 depends.

B) Claim 28 has been rejected because insufficient antecedent basis exists for the claim term “the housing inlet” Claims 28 and 32 have been amended to change the claim term “housing inlet” to “inlet end”. Applicant submits that the term “inlet end” is no narrower than “housing inlet” and, hence, claims 28 and 32 has not been narrowed by way of this amendment.

C) Claim 34 has been rejected because insufficient antecedent basis exists for the claim term “the pump”. Claim 34 has been amended to change the term “the pump” to “the air mover”. Applicant submits that the claim term “air mover” is no narrower than the claim term “the pump” and, hence claim 34 has not been narrowed by way of this amendment.

D) Claim 38 has been rejected because insufficient antecedent basis exists for the claim term “the load”. Applicant notes that line 1 of claim 38 introduces an electrical device having (1) *a load*, which provides proper antecedent basis for the later-recited claim term “the load”. (italics added for emphasis).

E) Claim 38 has been rejected because the claim term “standard alkaline size” renders the claim indefinite. Claim 38 has been amended to replace “a battery of standard alkaline size” with “an alkaline battery”. Applicant submits that the claim term “an alkaline

battery” is no narrower than “a battery of standard alkaline size” and, hence, claim 38 has not been narrowed by way of this amendment.

Applicant asserts that each rejection set forth under 35 USC 112 has been overcome and, accordingly, withdrawal of the rejections is respectfully requested.

V. Claim rejections under 35 USC 102

Claims 16, 17, 20-23, 25-27, 33, and 35-37 are rejected under 35 USC 102(e) as being anticipated by Siemenski. Claim 43 is rejected under 35 USC 102(b) as being anticipated by Cheiky.

A. Claims 16, 17, and 20-23

Independent claim 16 recites a battery configured to be installed in a battery compartment of an electrical device having at least one air-depolarized cell to supply power to the device. The battery includes a battery housing that defines a cell cavity containing the cell, a housing inlet, and a housing outlet. A first flow path links the inlet to the outlet. A second flow path is defined by a gap between the cell and the cell cavity and also links the inlet to the outlet. An air manager is included having an air mover configured to supply air to the housing inlet. One of the paths is used to stimulate air flow within the battery compartment, while the other path is used to deliver oxygen to the cell.

Claim 16 is rejected in view of Siemenski’s Fig. 10. Fig. 10, however, does not teach or suggest all limitations originally recited in claim 16. For instance, Fig. 10 does not illustrate a conduit defined by a gap between the cell and the cell cavity. Furthermore, Siemenski fails to teach a first conduit that delivers air from the inlet to the outlet for stimulating air flow within the battery, and a second conduit that delivers air to the cell.

Rather, Siemenski Fig. 10 illustrates a cross-section of a single cylindrical cell 22 disposed in a housing 64. (See Col. 12, lines 27-29). The cell includes an anode 68 having a radially outer edge that *abuts* the inner edge of housing 64. Accordingly, no conduit can exist between anode 68 and housing 64. While the axially outer ends of anode 68 form a gap with respect to the axial walls of housing 64, 1) the gaps don’t link the inlet to the outlet, and 2) air is incapable of flowing through the gaps. Rather, air flows from the inlet and through the only conduit provided in the cell. The conduit is defined by a hole extending through the oxygen permeable electrode 66. Accordingly, the cell operates by moving air into conduits 26b and 27b using air mover 28. All of the air then flows into the conduit defined by

electrode 66. None of the air that entering cell 22 flows through a conduit defined by a gap between the anode 68 and the housing 64.

The passageway 27 is said to collapse when no ambient air is being forced through (Col. 7, lines 61-63). The collapsed position allows passageways 27 to restrict ambient airflow when air mover 28 is not operating. (Col. 8, lines 26-28). Clearly, therefore, it is the goal of Sieminski, when air mover 28 is operating, to direct all incoming air across oxygen permeable electrode 66. Accordingly, Sieminski suffers from the very drawbacks that are identified in the “Background of the Invention” section of the present application.

Specifically, if cell 22 is installed in a battery compartment and air mover 28 is operating at a low flow rate, it is difficult to induce fresh air into the compartment. If, on the other hand, a higher flow rate is achieved, the cell will tend to dry out prematurely or flood as all air travels past the oxygen permeable electrode 66. (See Paragraphs 14 and 15, generally).

The present invention overcomes these drawbacks by producing a high flow rate in the housing while, at the same time, producing a low flow rate across the cell. Accordingly, the high flow rate through the housing does not damage the cell because only a portion of the air actually travels across the electrode, while the remaining portion of the air travels through a conduit to stimulate airflow. Because Sieminski only provides a single conduit that delivers air to the cell, Sieminski fails to overcome, or even address, the disadvantages that are overcome by the present invention.

Because the invention as recited in claim 16 differs both structurally and functionally from Sieminski, Applicant asserts that claim 16 is patentable over the cited prior art. Applicant further asserts that the patentability of claim 16 provides adequate support for the allowance of corresponding dependent claims 17 and 20-23. Withdrawal of the rejection of these claims is therefore respectfully requested.

B. Claims 25-27

Claim 25 recites a battery that is configured to be installed in a battery compartment of an electrical device having at least one air-depolarized cell to supply power to the device. The battery includes a battery housing that defines a cell cavity containing the cell. A housing inlet is in communication with a flow path past the cell. An air manager includes a battery outlet connecting the compartment to a location external with respect to the battery housing. The compartment further includes an air mover configured to supply draw air from

the battery compartment and supply a first portion of the drawn air to the cell via the flow path. A second portion of air is delivered to the battery outlet without entering the housing inlet. This embodiment is illustrated in Fig. 9 of the present application.

Applicant has reviewed Sieminski and has not identified each element of claim 25. In particular, Sieminski merely teaches an air manager operable to force air into a battery such that oxygen can communicate with an oxygen-permeable cell electrode. Sieminski fails to teach an outlet from the air manager to a location external with respect to the battery housing. Furthermore, Sieminski fails to teach or suggest forcing a first portion of air into a first flow path past the cell, and forcing a second portion of air into the outlet.

The invention as recited in claim 25 also achieves the dual function, split air flow (described above) by inletting air from the battery compartment a high flow rate, and exhausting the majority of this flow as auxiliary air flow through the outlet (See Paragraph 82).

As discussed above with respect to claim 16, Sieminski fails to teach or suggest a split flow configuration having one air flow path isolated from the cells (not even extending into the battery housing in claim 25) that stimulates air flow and a second flow path that delivers air to the cell. Because the invention as recited in claim 25 differs both structurally and functionally from Sieminski, Applicant asserts that claims 25-27 are patentable over the cited prior art. Withdrawal of the rejection of claims 25-27 is therefore respectfully requested.

C. Claims 33 and 35-37

Independent claim 33 recites a method for operating an air-depolarized cell battery. In general, claim 33 corresponds to elements of apparatus claim 16 discussed above. In particular, step (B) recites delivering a first portion of the air from the inlet to the outlet via a first flow path without engaging the cell to stimulate air flow through the battery compartment. Furthermore, step (C) recites delivering a second portion of the air from the inlet to a second flow path that delivers the second portion of the air to the cell. Finally, step (D) recites directing the first and second portions of the air through the outlet as exhaust air.

As discussed above, Sieminski fails to teach or suggest a pair of conduits, one of which stimulating air flow through the battery compartment, the other providing engaging the cell. Furthermore, Sieminski fails to even address or recognize the problem overcome by the claimed invention. Applicant therefore asserts that claims 33 and 35-37 are patentable over

the cited prior art. Withdrawal of the rejection of these claims is therefore respectfully requested.

C. Claim 43

Claim 43 has been rejected in view of Cheiky because the intended use must result in a structural difference between the claimed invention and the prior art.

Independent claim 43 has been amended to recite the battery compartment as including a battery cartridge having an inlet end and an outlet end and containing at least one metal-air cell. The cartridge further includes a first flow path delivering air from the inlet to the cell and a second flow path delivering air from the inlet to the outlet without engaging the cell to stimulate airflow through the cartridge. As discussed above with respect to claims 16 and 33, neither Cheiky, nor any of the other cited prior art references, teaches or suggests the structure (i.e., first and second flow paths) as recited in claim 43. The two flow paths enable a sufficient amount of air flow to be stimulated within the battery compartment without damaging the cell. As a result, the claimed combination is capable of drawing air into the battery compartment to support output from the power source of at least .045 watts per square centimeter of electrode area, as claimed.

Accordingly, Applicant respectfully requests that the rejection of claim 43 be withdrawn.

VI. Claim Rejections Under 35 USC 103

Claims 38-41 have been rejected under 35 USC 103(a) as being unpatentable over Sieminski in view of Machida. In particular, Machida is said to teach a “Figure-8” configuration for a battery cartridge that is combined with Sieminski’s air manager.

Claim 38 has been amended to recite that the battery housing includes an inlet and an outlet end and encasing a pair of air-depolarized cells arranged in a side-by-side orientation and connected at an interface (claim 39 has been cancelled). This connection is illustrated in Figs. 2B and 5. Claim 38 further recites a conduit extending through the interface and connecting the inlet end to the outlet end. The conduit is labeled “60” in Fig. 5. An air mover chamber is positioned at the inlet end and is operable to supply air to conduit and the cells when current is drawn by the load.

Even if Machida was combined with Sieminski in the manner described in the Office Action, the combination would fail to teach or suggest the invention recited in claim 38.

Rather, the combination would produce a pair of cells in a cell cavity having an air manager at one end. Furthermore, Sieminski teaches away from such a combination by requiring that a barrier 50 be disposed between adjacent cells in order to direct airflow over the electrodes of the metal-air cells (Col. 12, lines 1-7). While barrier 50 is absent in Sieminski Fig. 10, it is noted that the air mover 28 is external in this embodiment (See Col. 12, lines 27-30). The air mover is claimed as part of the battery cartridge in claim 38. Even if Fig. 10 of Sieminski was combined with Machida, the combination would still fail to teach the present invention of claim 38 because a gap between adjacent cells as taught in Fig. 10 would prevent two cells to be connected in a “Figure-8” (or side-by-side) orientation as taught in Machida.

The conduit of claim 38 enables air flow to be stimulated throughout the battery cartridge, which enables a high flow rate through the cartridge that draws a sufficient amount of oxygen into the cartridge without bringing a large quantity of air across the cell that could either render the cell susceptible to dry-out or flooding, as described above with reference to the present “Background of the Invention” section. None of the cited prior art references recognizes this advantage, and further provides no other motivation to combine a side-by-side configuration of Machida with an air manager system of the type disclosed in Sieminski.

Because no teaching or suggestion exists to combine Machida and Sieminski, and because, even if combined, the combination fails to teach or suggest each and every element of claim 38, Applicant asserts that claim 38 is patentable over the cited references. Accordingly, withdrawal of the rejection of claims 38-41 is respectfully requested.

VII. Additional Claim Amendments

Claim 17 has been amended to delete the superfluous claim language “housing via a”.

Claim 19 has been amended to change “conduit” to “flow path” for the purposes of consistency with independent claim 16. Applicant notes that “flow path” is no narrower than “conduit” and, hence, claim 19 has not been narrowed by way of this amendment.

Claim 28 has been amended to change “a flexible conduit” to “flexible tubing” for the purposes of consistency with the remainder of claim set 28-32. Applicant notes that tubing is no narrower than the claim term “conduit” and, hence, claim 28 has not been narrowed by way of this amendment.

Claim 35 has been amended for the purposes of consistency with respect to claim 33.

Claim 40 has been amended for proper dependency with independent claim 38 in recognition that claim 39 has been cancelled.

Claim 42 has been amended for the purposes of consistency with respect to claim 38.

VIII. New Claims

Applicant has added new claims 44-51, which correspond generally to original claims 16-24. Independent claim 44 recites a battery configured to be installed in a battery compartment of an electrical device having at least one air-depolarized cell to supply power to the device. The battery includes a battery housing that defines a cell cavity containing the cell, and a housing inlet receiving supply air. A first flow path is defined by a gap between the cell and the cell cavity in communication with the inlet, the first flow path receiving a first portion of the supply air to deliver oxygen to the cell. A second flow path extends between the housing inlet and the housing outlet. The second flow path receives a second portion of the supply air to stimulate air flow within the battery compartment. The battery further includes a housing outlet receiving air from the first and second low paths and outputting exhaust air. A first portion of the exhaust air exits the battery compartment, and a second portion of the exhaust air is re-circulated towards the housing inlet. An air manager is also included that has an air mover configured to receive and direct the supply air to the housing inlet. An air manager is provided having an air mover configured to receive and direct the supply air to the housing inlet, wherein the supply air includes re-circulated exhaust air.

Independent claim 44 is thus similar to claim 16 as originally filed, and furthermore includes claim limitations from original dependent claim 18. Dependent claim 18 recites that a first portion of the exhaust air is re-circulated within the battery compartment to the air mover, and a second portion of the exhaust air exits the battery compartment. The Office Action found that claim 18 contains allowable subject matter over the prior art. Applicant asserts that independent claim 44, as amended, incorporates the patentable subject matter of claim 18. In particular, claim 44 recites that a portion of the exhaust air exits the battery compartment from the outlet, and another portion of the exhaust air is re-circulated towards the inlet, and forms part of the supply air that is received by the air mover.

Applicant therefore asserts that claim 44 is allowable over the cited prior art. The allowance of claim 44 provides sufficient basis for the allowability of corresponding dependent claims 45-51. Formal allowance of claim 44 is therefore respectfully requested.

Applicant has further added new claims 52 and 53 that each depend from claim 16. Claim 52 further recites that the air travels along the first flow path to stimulate air within the battery compartment. Claim 53 further recites that the air travels along the second flow path to deliver oxygen to the cell. Applicant asserts the patentability of independent claim 16 as basis for the allowability of claims 52 and 53. Formal allowance of claims 52 and 53 is respectfully requested.

New claim 54 depends from claim 33, and recites that the second flow path is defined by a gap between the cell and the battery compartment. Applicant asserts the patentability of independent claim 33 as basis for the allowability of claim 54. Formal allowance of claim 54 is respectfully requested.

New claims 55 and 56 each depend from claim 1. Claim 55 recites that the bypass airflow conduit is defined by an elongated space between two cells. Claim 56 further limits the bypass airflow conduit to a cylindrical wall extending between the cells. Claims 55 and 56 illustrate that the term “conduit” recited in claim 1 is not, in the broadest interpretation, not to be limited to either embodiment recited in claims 55 and 56. Applicant asserts the patentability of independent claim 1 as sufficient basis for the allowability of claims 55 and 56. Formal allowance of claims 55 and 56 is respectfully requested.

IX. Allowed Claims

Applicant notes with appreciation that claims 1-15 have been allowed.

X. Allowable Subject Matter

Applicant notes with appreciation that claims 19, 24, and 42 have been found to contain patentable subject matter. Applicant asserts the patentability of corresponding independent claims 16 and 38 as providing sufficient basis for the basis for the allowability of claims 19, 24, and 42. Formal allowance of claims 19, 24, and 24 is respectfully requested.

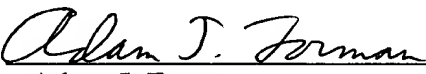
XI. Conclusion

Applicant therefore respectfully asserts that all rejections and objections cited by the Examiner have been overcome. Accordingly, the application is in condition for allowance, and a Notice of Allowance is earnestly solicited.

Applicant hereby authorizes the Commissioner to charge the \$302 fee for the addition of one additional independent claim greater than three (\$86), and twelve additional claims in excess of twenty (\$216) along with any additional fees that are deemed due arising from this or any other communication, to deposit account No. 17-0055. The Examiner is invited to contact the undersigned at the telephone number appearing below if such would advance the prosecution of this application.

Respectfully submitted,

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"Marked-up" drawings

3 / 12

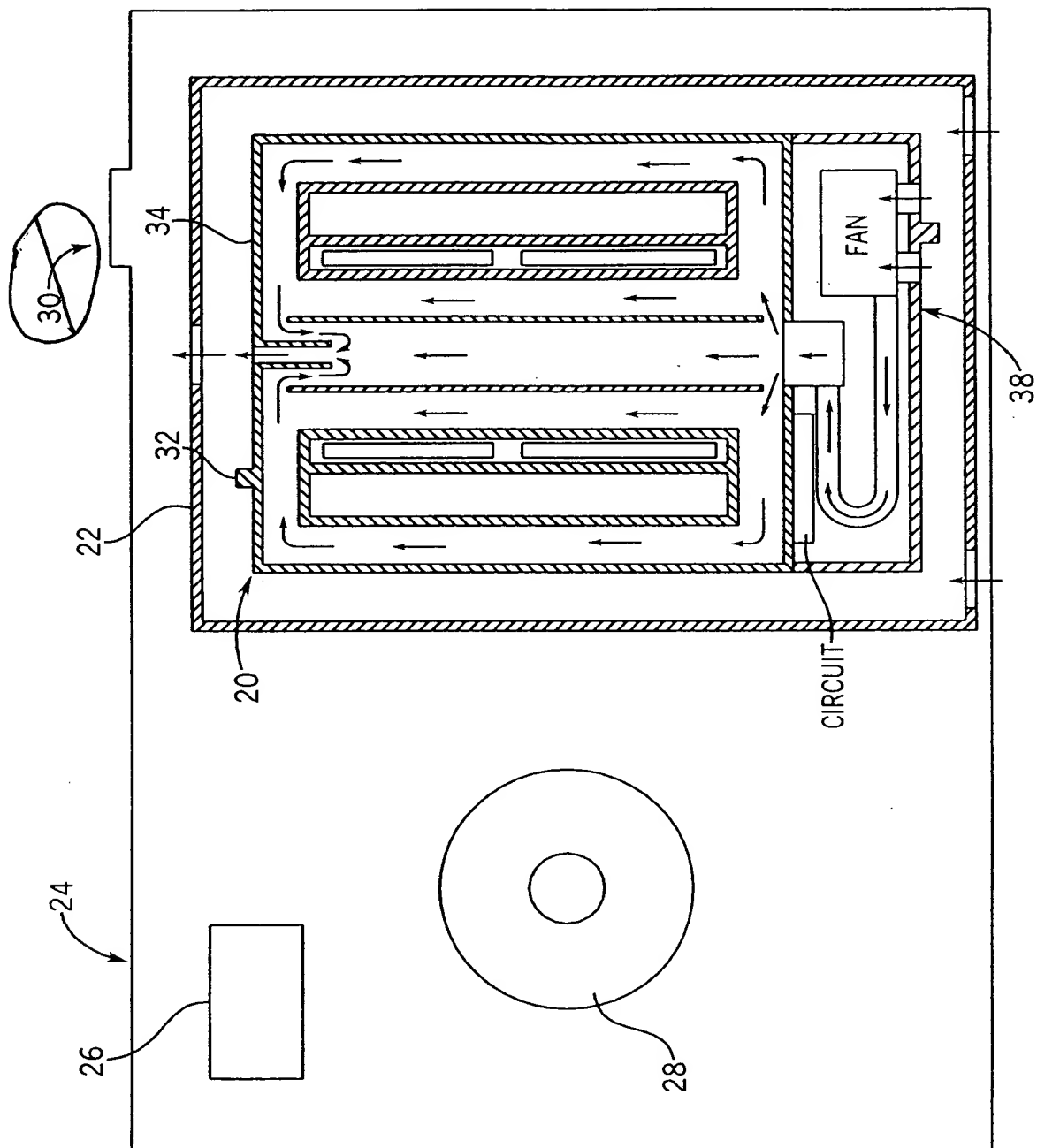


FIG. 3

FIG. 4

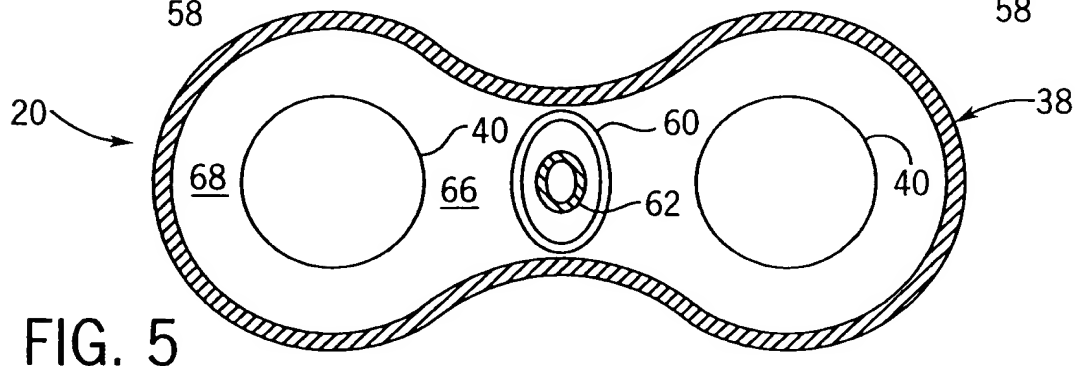
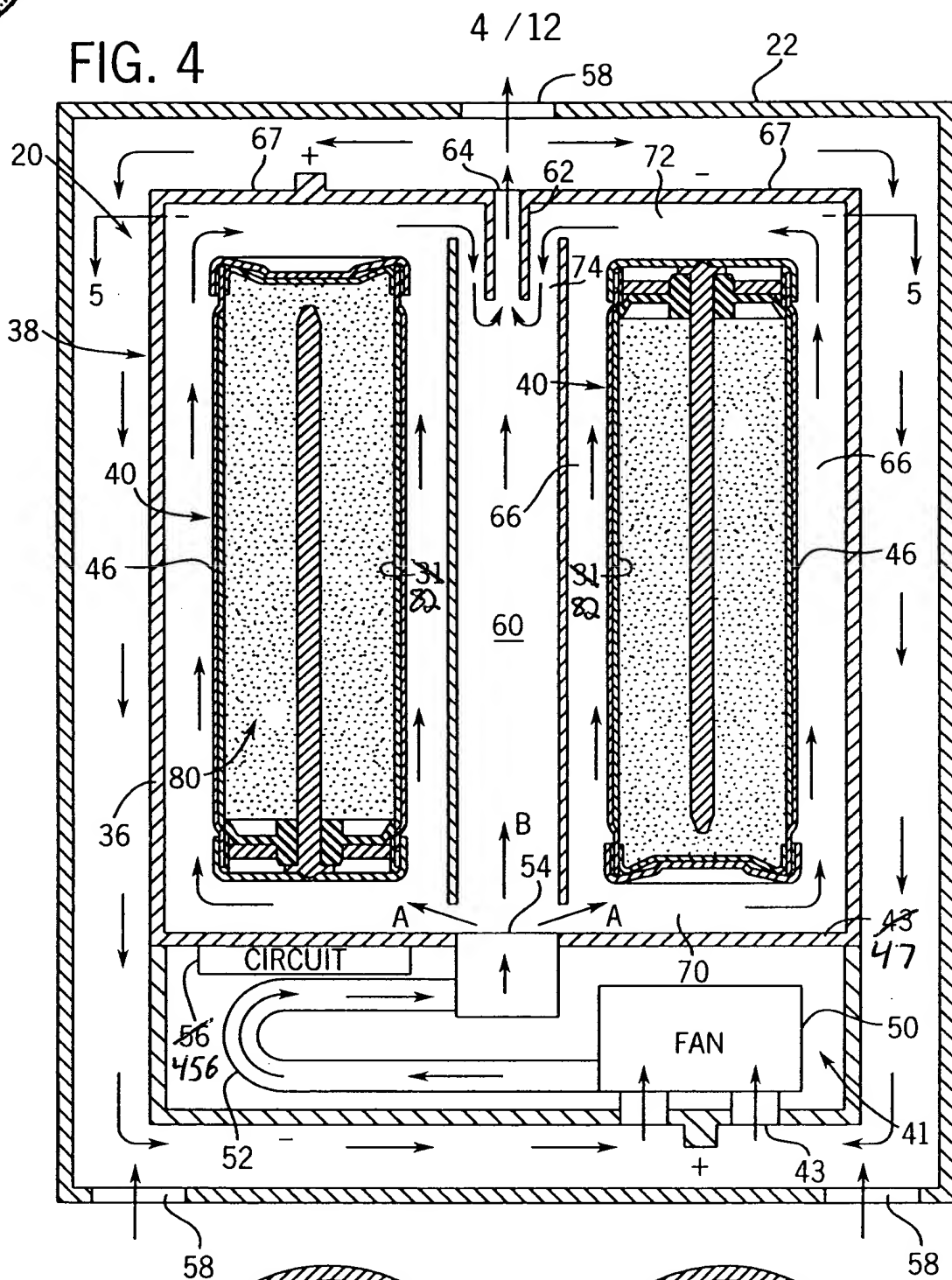


FIG. 5

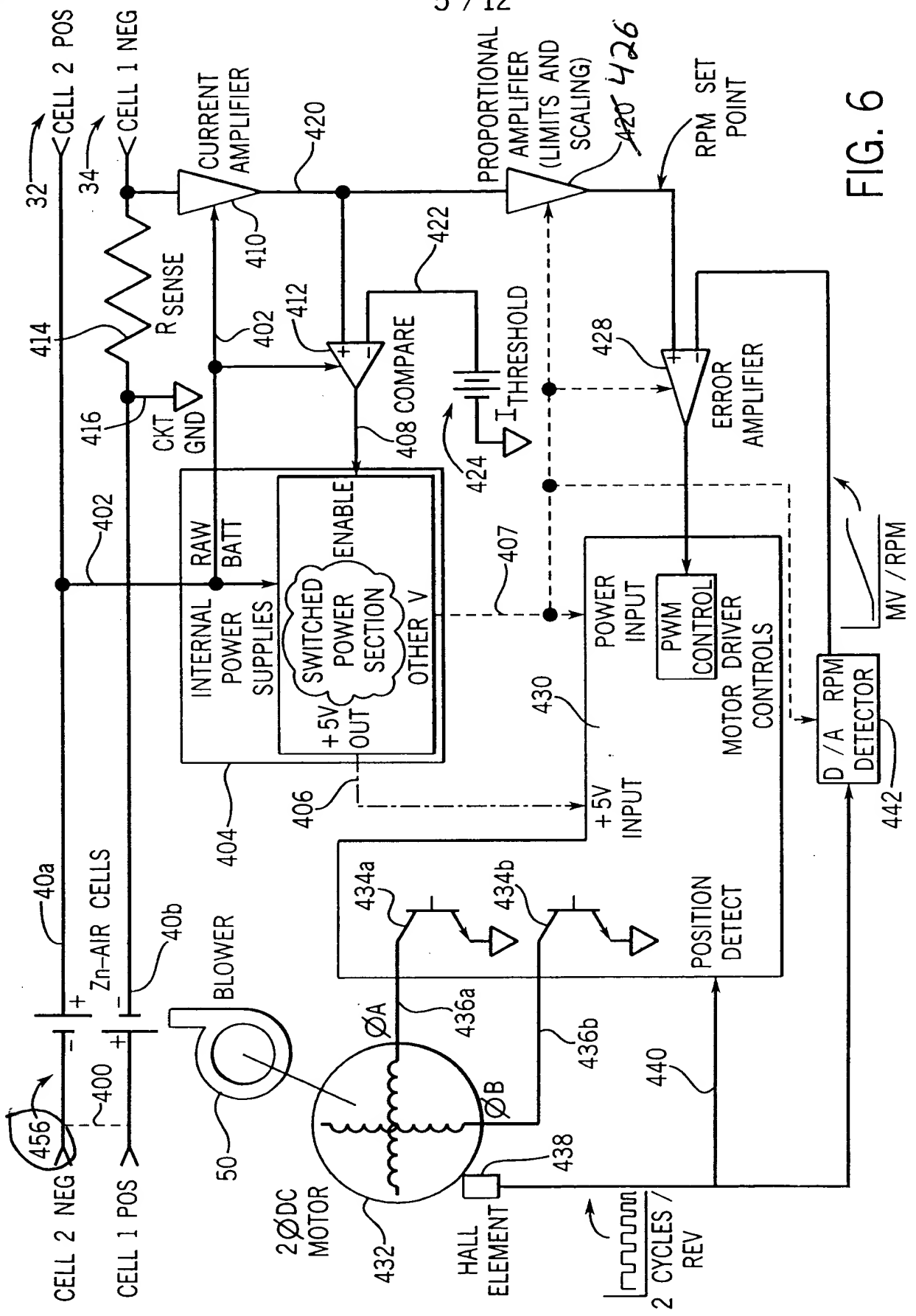


FIG. 6

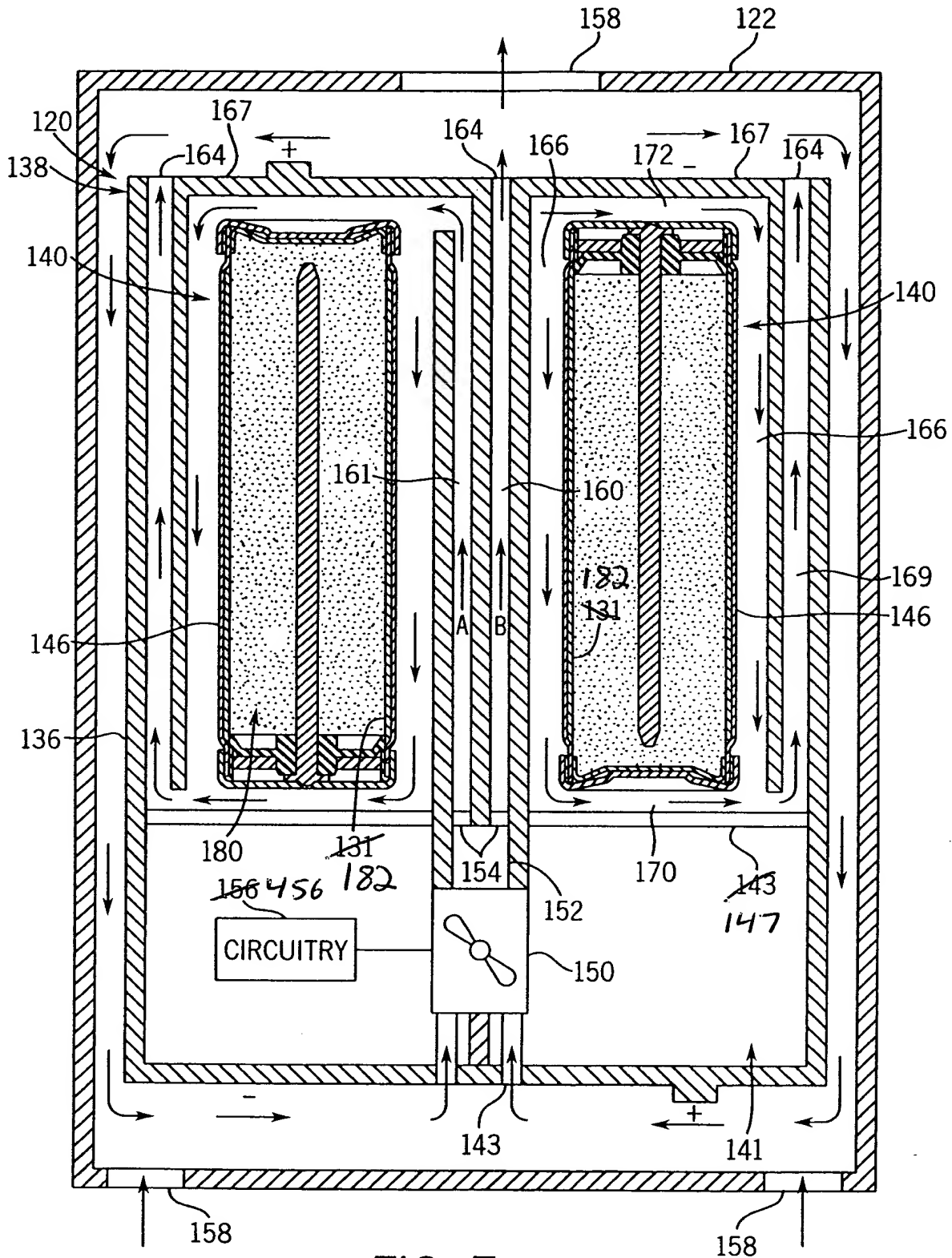


FIG. 7

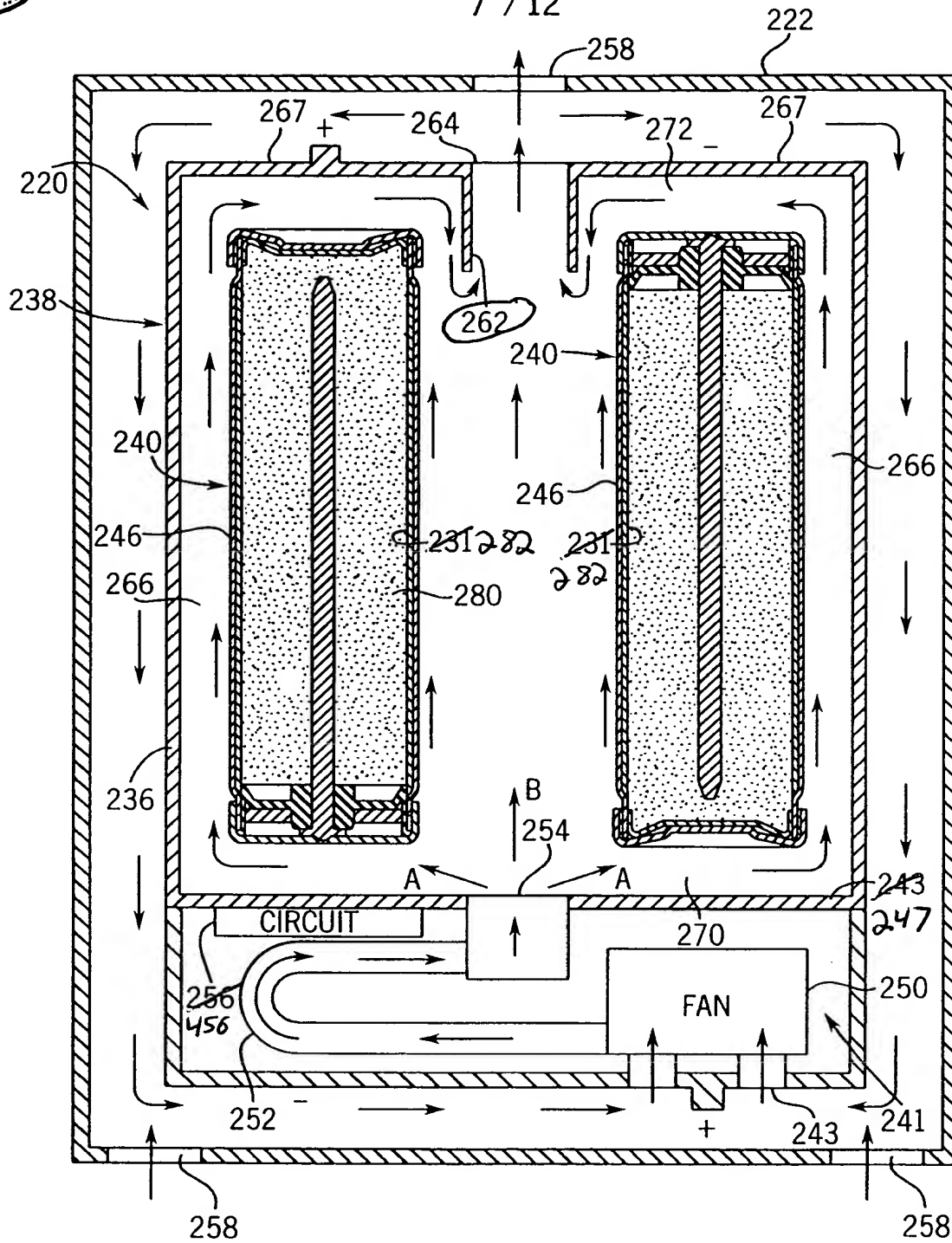


FIG. 8

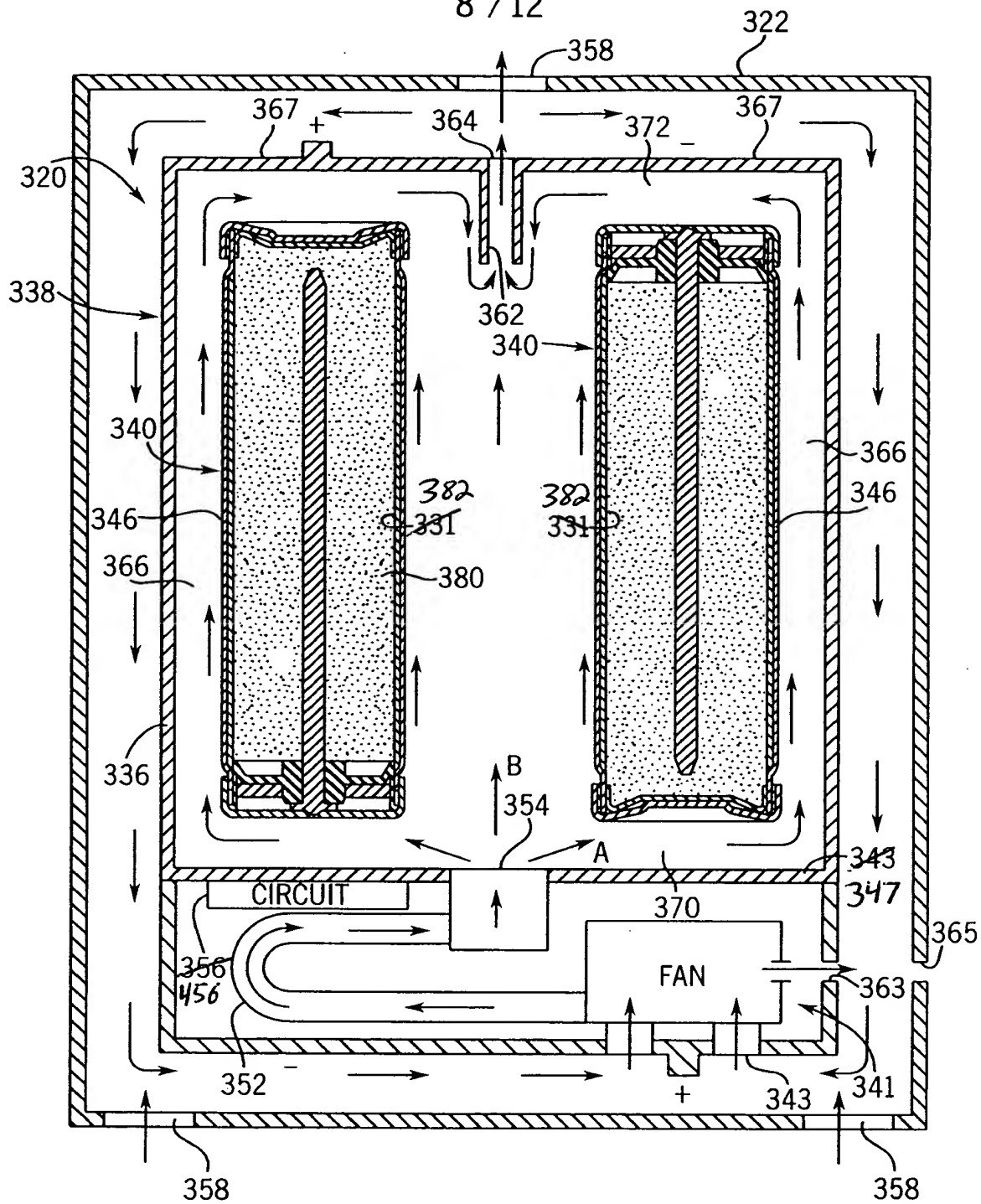


FIG. 9